nected with the positive or with the negative terminal of a little Voss electric machine, its fumes (products of combustion mixed with air) sent through a block-tin pipe, four metres long, and one centimetre bore, ending with a short insulating tunnel of paraffin and the electric filter, gives strong positive or strong negative electricity to the filter.

§ 18. Using the little biscuit-canister and electrified needle, as described in "our communication"[*] to the Royal Society "On the Diselectrification of Air," but altered to have two insulated needles with varied distances of from half a centimetre to two or three centimetres between them, we find that when the two needles are kept at equal differences of potential positive and negative, from the enclosing metal canister, little or no electrification is shown by the electric filter; and when the differences of potential from the surrounding metal are unequal, electrification, of the same sign as that of the needle whose difference of potential is the greater, is found on the filter.

When a ball and needle-point are used, the effect found depends chiefly on the difference of potentials between the needle-point and the surrounding canister, and is comparatively little affected by opposite electrification of the ball. When two balls are used, and sparks in abundance pass between them, but little electricity is deposited by the sparks in the air, even when one of the balls is kept at the same potential as the surrounding metal. [The communication was illustrated by a repetition of some of the experiments shown on the occasion of a Friday evening lecture[†] on Atmospheric Electricity at the Royal Institution on May 18, 1860, in which one half of the air of the lecture-room was electrified positively, and the other half negatively, by two insulated spirit lamps mounted on the positive and negative conductors of an electric machine.]

(2) "ON THE THERMAL CONDUCTIVITY OF ROCK AT DIFFERENT TEMPERATURES."

Experiments by Lord Kelvin and Mr. Erskine Murray were described, and the apparatus used in them was shown, by which it was found that the thermal conductivity of specimens of slate, sandstone, and granite is less at higher temperatures than at lower for each of these rocks. The last tested was Aberdeen granite, for which experiments of fairly satisfactory accuracy showed the mean conductivity for the range from 146° C. to 215° C. to be 86 per cent. of the mean conductivity in the range from 81° C. to 146° C. They hope to send a communication to the Royal Society describing their work before the end of the present session.

KELVIN.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—Mr. D. R. Pike, of the Charterhouse, has been elected to an open Exhibition in Natural Science at Jesus College, and Mr. L. C. W. Brigstocke, of Haverfordwest Grammar School, has been elected to a Welsh Foundation Scholarship in Natural Science at the same College.

Open Scholarships and Exhibitions in Natural Science have been announced for competition at Merton College, New College, Magdalen College, and Corpus Christi College. Particulars may be obtained on application to the Dean in any of these Colleges.

CAMBRIDGE.—The Walsingham Medal for an original monograph on a botanical, geological, zoological, or physiological subject will be awarded in the Michaelmas Term. Essays are to be sent to Prof. Newton by October 10, 1895. Candidates must be B.A.'s not of standing to take the M.A. degree.

The subject for the Adams Prize of 1897 is connected with Bessel's Functions. It is set forth in the *University Reporter* for May 14. The prize is of the value of about £197. It is open to all graduates of the University. Essays are to be sent to the Vice-Chancellor by December 16, 1896.

THE Association of Technical Institutions has endeavoured to induce the Science and Art Department to discontinue the examinations now held in practical inorganic and organic chemistry, and to award attendance grants for instruction in those subjects, the amount of such grants to be dependent upon the report of the Department's inspectors on the efficiency of the equipment and teaching. The Association has received a reply to the effect that it is not possible for the Department to comply with their request. A new syllabus for practical inorganic chemistry will appear, however, in the forthcoming edition of the Science and Art Directory, and there seems little doubt that the instruction will be so arranged in it as to make it possible to coordinate more closely the laboratory and lecture work in that subject, and afford the same latitude to teachers as is given by the new Regulations for Organised Science Schools.

SCIENTIFIC SERIALS.

American Journal of Mathematics, vol. xvii. No. 2 (Baltimore, April 1895).—A method for calculating simultaneously all the roots of an equation, is a paper by Dr. E. McClintock, which was read before the American Mathematical Society on August 14 and October 27, 1894. It opens with the application to an example employed by Spitzer and by Jelinek. The calculations of these mathematicians can only be done for a pair of roots at a time, and that with considerable difficulty. The method employed by our author is fairly facile. Very little has hitherto been done in the direction of this memoir, which is one of great value in the subject of algebraic equations. The writer discusses eleven examples at length, the highest degreed equation being one of the sixth degree in x.—Sur le logarithme de la fonction gamma, by Hermite, is a note upon Raabe's integral, in continuation of an article in the *Math. Annalen* (41, p. 581).—Sur la pression dans les milieux diélectriques ou magnétiques, by Prof. P. Duhem, corrects an error in his "Leçons sur l'Electricité et le magnétisme," and is a valuable working out of the theory of the pressures, initiated by Clerk Maxwell, and further improved by von Helmholtz, Kirchhoff, and other writers. The number closes with an article on ternary substitution-groups of finite order which leave a triangle unchanged, by H. Maschke. This paper is complementary to C. Jordan's "Sur les équations, differentielles linéaires à integrale algébrique," and "Sur la détermination des groupes d'ordre fini contenues dans le groupe linéaire."

Zeitschrift für wissenschaftliche Zoologie, Bd. lix. Heft 1.—Prof. A. R. von Heider gives a detailed description of a new Actinian (*Zoanthus chierchiæ*) obtained during the cruise of the *Vettor Pisani*. Prof. A. Korotneff describes the embryonic development of *Salpa democratica*. According to him the follicle-cells do not play the important part in the development of *Salpa* which Salensky attributed to them, nor do they form a temporary scaffolding for the blastomeres, as stated by Brooks. The embryo is built up of blastomeres in the normal manner, and embryonic layers are present with the same significance as in other groups. The cloaca is formed by the union of endodermal diverticula, and the pericardium develops as an outgrowth of the pharynx.—Prof. W. Schimkewitsch writes upon the structure and development of a species of *Dinophilus* living in the White Sea, near the Solovetzki laboratory. The twofold affinities of this interesting type, on the one hand with the Annelids, and on the other with the Rotifers, are succinctly stated.—Prof. Vejdovsky writes upon the sexual apparatus of *Lumbriculus variegatus*.—Dr. Montgomery deals fully with the anatomy of a new type of Nemertine (*Stichostemma Eilhardi*) discovered in fresh-water aquaria in the Berlin Zoological Institute.—Dr. McKim describes the nephridial funnel apparatus of *Hirudo*.

SOCIETIES AND ACADEMIES.

EDINBURGH.

Royal Society, March 18.—The Rev. Prof. Flint, Vice-President, in the chair.—Prof. Crum-Brown communicated a paper, by Mr. R. Fairbairn and himself, on the action of sodium mercaptide on dibromomalonic ether.—Prof. J. C. Ewart communicated a paper, by Mr. F. J. Cole and himself on the dorsal branches of the cranial and spinal nerves in elasmobranchs.—Dr. Traquair read a paper on phosphorescent sandstones.—Prof. Tait read a note on the electromagnetic wave-surface.

April 1.—Sir Douglas Maclagan, President in the chair.—A paper, by the Duke of Argyll, on the glaciation of two glens, was read. The glens are Glenaray and Glenshira. The usual explanation of the phenomena of glaciation as observed in the West Highlands is that the glaciation was caused by an enormous ice-cap covering the whole country. His Grace does not consider that the phenomena can be so explained. Rocks are found which are striated and smoothed on one side, while the other side remains rough. Isolated blocks, without striation, are found in positions where they could not have been placed except by the agency of floating ice-floes. He considers that the marks of glaciation were caused by ice-floes, driven by strong north-east and south-west currents, in a sea whose surface reached a level on the land of from 1500 to 2000 feet over the present level. The two glens run nearly parallel in a north-easterly direction, and are separated by a range of hills and moors not much more than two miles broad. The rocks of both belong to the same geological formation, and yet the glens are entirely dissimilar in appearance. Glenshira has smooth, regular slopes, with a smooth level bottom; Glenaray is a typical highland glen traversed by a rapid river with a rocky bed and three waterfalls, and exhibits strong glaciation. His Grace does not consider that an ice-sheet, operating over the whole country, could account for these differences. Neither does he consider that local glaciers could have produced the effect, for such a glacier must have been formed on the slopes of Ben Loy and have flowed down Glenshira. On the other hand, Glenaray terminates in a low pass 480 feet above sea-level, while Glenshira is closed in by ridges 2000 feet in height. The former was therefore open to the action of floes, while the higher peaks would shelter the latter.

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[*] *Proceedings* of the Royal Society, March 14, 1895.

[†] "Electrostatics and Magnetism," xvi, §§ 285, 286.

April 17.—Sir Douglas Maclagan, President, in the chair.—Prof. Flinders Petrie gave a lecture "On a New Race in Egypt," describing the result of his work in Egypt during the last season.

PARIS.

Academy of Sciences, May 6.—M. Marey in the chair.—The zoological work of James Dana, by M. Blanchard. The main outlines of James Dana's work are sketched from a zoologist's point of view. Reference is particularly made to his work on the geographical distribution of zoophytes, on coral reefs and islands, on animal distribution with reference to depth and temperature in the sea, and on Crustaceans.—The mineralogical and geological work of James Dana, by M. Daubrée. A very full account is given of the chief points in Dana's geological work, special reference being made to his publication of a "System of Mineralogy," and his "Manual of Geology."—The work of M. Carl Vogt, by M. Émile Blanchard.—Researches on the cerite earths, by M. P. Schützenberger. The author establishes the result that in cerite, cerium oxide is accompanied by small quantities of another earth of a metal with somewhat lower atomic weight, which is capable of being oxidised like cerium oxide, and of which the sulphate is isomorphous with that of cerium, and gives insoluble double sulphates with alkaline sulphates. The calcined higher oxide is of reddish-brown colour, even without presence of didymium.—Action of fluorine on argon, by M. Henri Moissan (see Notes, p. 61).—Systematic application of the potato to the feeding of cattle, by M. Aimé Girard. The results are reported of experiments on the feeding of cattle and sheep, both quantity and quality of meat obtained being considered. The best results were obtained with given proportions of cooked potatoes and hay, a very superior article being obtained yielding high profits.—Report on the table of triangular numbers of M. Arnaudeau.—On the orbit of the 1771 comet, by M. Bigourdan. A re-examination of the original manuscript of Saint-Jacques has allowed the discovery of an error made by Burckhardt in reducing observations of this comet. The result of a preliminary recalculation of the observations allows the definite rejection of a hyberbolic orbit, and renders it very probable that the orbit is an ellipse of eccentricity 0·998.—Every algebraical condition imposed on the movement of a body is realisable by means of an articulated system, by M. G. Kœnigs.—On the use of a fourth dimension, by M. de la Rive.—On fluted spectra, by Prof. Arthur Schuster. A discussion of the different interpretation of phenomena by the author and M. Poincaré. In conclusion, the author is unable to doubt the justice of M. Gouy's view, that the regularity of the vibrations, shown by the observations of Fizeau and Foucault, does not exist in the luminous movement, but is produced by the apparatus used.—Unequal absorption of dextrorotatory and lævorotatory circularly polarised light in certain active substances, by M. A. Cotton. This unequal absorption is indicated by the conversion of a plane polarised ray into an elliptically polarised ray by passage through substances such as the coloured metallic tartrates. The method of measuring the effect is indicated and results promised in a further communication.—On the freezing of solutions at constant temperature, by M. Sarrau. Solidification is produced under pressure so that no lowering of the freezing point occurs, the connection between the compensating pressure and molecular weight is considered.—Closed isothermal cycles, reversible and maintained in equilibrium by gravity, by M. A. Ponsot.—Observations on the project of a balloon expedition to the Arctic regions put forth by M. S. A. Andrée, by M. Gaston Tissandier.—Researches on mercurous sulphate, nitrate, and acetate, by M. Raoul Varet. The heats of formation from their elements taken in their actual states are: for Hg_2SO_4 sol. + 175 Cal.; for $Hg_2(NO_3)_2 2H_2O$ sol. + 69·4 Cal.; and for $Hg_2(C_2H_3O_2)_2$ sol. + 202·1 Cal.—On the presence of chitin in the cellular membrane of mushrooms, by M. Eugene Gilson. Chitin has been found in all the fungi examined, taking the place and fulfilling the functions of cellulose in phanerogams and cryptogams. The experimental evidence concerns Agaricus campestris, Amanita muscaria, Cantharellus cebarius, Hypholoma fasciculare, Polyporus officinalis, Polyporus fumosus, Russula, Boletus, Tricholona, Bovista, and Claviceps purpurea.—Comparative study of the "appareils odorifiques" in the different groups of Heteropterous Hemiptera, by M. J. Künckel d'Herculais.—Overlap of the Jurassic beds in the massif of the Vendée, by M. Fred. Wallerant.—Influence of de-oxygenated blood, and of some poisons, on the contractility of the lymphatic vessels, by MM. L. Camus and E. Gley.—On the scarlatinous streptococcus, by M. Ad. d'Espine.—The manuring of vines and quality of the wines, by M. A. Müntz. The supposed deleterious action of manure on the quality of wine produced from the dressed vineries has no substantial foundation in fact.

BERLIN

Physiological Society, April 5.—Prof. H. Munk, President, in the chair.—Prof. J. Munk had investigated the excretion of mineral waste during Prof. Zuntz' experiments on the effects of excessive exercise on metabolism. (See NATURE, vol. li. p. 503.) He found that the urinary output of sulphur was increased in correspondence with the increased proteid metabolism, the excess taking the form of sulphuric acid, not of ethereal-sulphates. Phosphorus and potassium were also similarly increased, and since neither of them are normal constituents of proteid, their greater excretion denoted some destruction of other tissues. This view was confirmed by the increased excretion of lime, which further points to a possibly greater metabolism of bone-tissue during the exercise.—Dr. Treitel had carried out observations on the perception of the vibrations of tuning-forks by the skin, and had found that the sensibility varied in different parts of its surface, and did not correspond with that for the perception of mere touch or localisation.—Dr. Schultz demonstrated the contraction of single bundles of unstriated muscle-fibres on a preparation made from the muscular coat of a frog's stomach. The fibres could be seen to slowly contract on electric stimulation, relaxing equally slowly after the stimulus had ceased.

Meteorological Society, April 2.—Prof. Hellmann, President, in the chair.—Dr. Less spoke on the various types of winter weather, dealing in detail with the five types established by Teisserenc de Bort as depending on the distribution of barometric maxima and minima over the Atlantic Ocean and Europe. He added to these a sixth type of mild and squally weather which most usually follows after other types of warm winter weather. He pointed out that the winter just past could for the most part not be included under any of the above six types.

Physical Society, April 26.—Prof. Schwalbe, President, in the chair.—Dr. Pringsheim gave an account of his experiments on the electric conductivity of heated gases. In a Chamotte-tube closed by brass caps the various gases, such as air, hydrogen, and carbon dioxide, were heated to a temperature of 700° to 900° C. The electrodes consisted of circular discs of platinum capable of being placed at varying distances from each other. A current of 1·6 to 10 volts was passed through the gases, and all the results obtained by Becquerel in 1853 were confirmed. As the electrodes were separated from each other the deflection of the galvanometer became less, and with constant distance between the electrodes the current became less the longer it flowed. This fact led to the suspicion, verified by experiment, that polarisation was here playing a part. On breaking the primary current, the polarisation of the electrodes was quite perceptible for a full half-hour. The speaker concluded from the above that conduction in heated gases is an electrolytic phenomenon, and intends to carry on his researches, using more carefully purified gases and a trustworthy pyrometer.—Dr. du Bois reported on a paper presented by Prof. van Aubel, dealing with Hall's phenomenon as investigated on thin layers of bismuth deposited electrolytically. It appeared that when the deposit was made from nitrate of bismuth the phenomenon was as marked as it is with cast plates of the metal, whereas when deposited from the tartrate the phenomenon was either extremely feeble or non-existent. The asymmetry of the phenomenon on reversal of the magnetic field was explained by the author as due to the influence exerted by the magnetic field on the electric conductivity of the metal. He further regarded the difference in behaviour of the metallic film as precipitated, on the one hand, from the nitrate, and on the other, from the tartrate or citrate, as due to the fact that in the case of the latter salts the bismuth is mixed with carbon, whereas in the case of the nitrate the metal is deposited in a pure state.

DIARY OF SOCIETIES.

London.

THURSDAY, May 16.

Royal Society, at 4.30.—On Measurements of Small Strains in the Testing of Materials and Structures: Prof. Ewing, F.R.S.—The Electrical Measurement of Starlight. Observations made at the Observatory of Daramona House, Co. Westmeath, in April 1895. Preliminary Report: Prof. G. M. Minchin.—The Complete System of the Periods of a Hollow Vortex Ring: H. C. Pocklington.—India's Contribution to Geodesy: General Walker, F.R.S.

Chemical Society, at 8.—Ballot for the Election of Fellows.—Kjeldahl's Process for the Determination of Nitrogen; Dr. Bernard Dyer.—The Action of Nitrous Acid on 1 : 4 : 2 Dibromaniline: Prof. Meldola, F.R.S., and E. R. Andrews.—Derivatives of Succinyl and Phthalyl Dithiocarbimides: Prof. Dixon and Dr. Doran.

Royal Institution, at 3.—The Liquefaction of Gases: Prof. J. Dewar, F.R.S.

Society of Antiquaries, at 8.30.

FRIDAY, May 17.

Quekett Microscopical Club, at 8.

Epidemioloical Society.—Paper by Dr. Washbourn.

SATURDAY, May 18.

London Geological Field Class (Cannon Street Station), at 2.17.—Excursion to view Escarpment Valleys from the Weald to Chalk.

Geologists' Association (Cannon Street Station), at 1.35.—Excursion to Betchworth and Headley.

Essex Field Club (Chingford, 2 p.m., and High Beach, 4 p.m.).—Inspection of Forest, and Paper by Mr. E. N. Buxton, on Plan for forming a Protected Area for certain Birds in Old Waltham Forest District.

MONDAY, May 20.

Society of Arts, at 8.—Japanese Art Industries: Dr. Ernest Hart.

Royal Geographical Society, at 8.45.—Meeting to Commemorate the Fiftieth Anniversary of the Sailing of the Arctic Expedition under Sir John Franklin.

Victoria Institute, at 4.30.—Prof. E. Hull, F.R.S.

Medical Society, at 8.30.

TUESDAY, May 21.

Royal Institution, at 3.—Thirty Years' Progress in Biological Science (II.): Prof. E. Ray Lankester, F.R.S.

Society of Arts, at 8.—Commercial Education in Belgium: Prof. William Layton.

Zoological Society, at 8.30.—On the Ornithological Collections made by Dr. Donaldson Smith during his Recent Expedition in Somaliland and Gallaland: Dr. R. Bowdler Sharpe.—A Synopsis of the Genera and Species of Apodal Batrachians, with Descriptions of a New Genus and Species (Bdellophis vittatus): G. A. Boulenger, F.R.S.—List and Distribution of the Land-Mollusca of the Andaman and Nicobar Group of Islands in the Bay of Bengal, with Descriptions of some New Species: Lieut.-Colonel H. H. Godwin-Austen, F.R.S.—On a New Species of Hedgehog from Somaliland: Dr. J. Anderson, F.R.S.

Institution of Civil Engineers, at 8.—Last Ballot for Members for the Session.

Royal Statistical Society (Royal United Service Institution), at 5.—Municipal Finance: E. Orford Smith.

Royal Photographic Society, at 8.—Apparatus for Process Photography: Wm. Gamble.

Royal Victoria Hall, at 8.—The History of a Myth: Prof. Sollas, F.R.S.

Pathological Society, at 8.30.

WEDNESDAY, May 22.

Society of Arts, at 8.—The Dressing and Metallurgical Treatment of Nickel Ores: A. G. Charleton.

Geological Society, at 8.—On a Human Skull and Limb-Bones found in the Palæolithic Terrace-Gravel at Galley Hill (Kent): E. T. Newton, F.R.S.—Geological Notes of a Journey round the Coast of Norway and into Northern Russia: G. S. Boulger.—On Rhætic Foraminifera from Wedmore (West Somerset): Frederick Chapman.

THURSDAY, May 23.

Royal Institution, at 3.—The Instruments and Methods of Spectroscopic Astronomy: Dr. W. Huggins, F.R.S.

Society of Arts, at 4.30.—The Northern Balochis: their Customs and Folk-lore: Oswald V. Yates.

Institution of Electrical Engineers (Society of Arts), at 8.—On the Recent Development of the Single-Acting High-Speed Engine, for Central Station Work: Mark H. Robinson.

FRIDAY, May 24.

Royal Institution, at 9.—The Absolute Measurement of Electrical Resistance: J. Viriamu Jones, F.R.S.

Linnean Society, at 3.—Annual Meeting.

Physical Society, at 5.—On Mixtures of Ethane and Nitrous Oxide: Dr. Kuenen.—The Measurement of Cyclically Varying Temperature: H. F. W. Burstall.

SATURDAY, May 25.

Geologists' Association (Paddington Station), at 10.2 a.m.—Excursion to Goring. Directors: J. H. Blake and W. Whitaker, F.R.S.

London Geological Field Class (Waterloo Station), at 3.5.—Excursion to the Bagshot Sand Hills at Frimley.

Royal Botanic Society, at 3.45.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

Books.—Æsthetic Principles: H. R. Marshall (Macmillan).—Crystallography: Prof. N. Story-Maskelyne (Oxford, Clarendon Press).—A Primer of Mayan Hieroglyphics: Dr. D. G. Brinton (Boston, Ginn).—The Migration of British Birds: C. Dixon (Chapman).—Electricity in our Homes and Workshops: S. F. Walker, 3rd edition (Whittaker).—The Practical Telephone Handbook, J. Poole, 2nd edition (Whittaker).—The Land Birds in and around St. Andrews: G. Bruce (Dundee, Leng).—Wild Nature won by Kindness: Mrs. Brightwen, 6th edition (Unwin).—The Elements of Botany: F. Darwin (Cambridge University Press).—John Dalton and the Rise of Modern Chemistry: Sir H. E. Roscoe (Cassell).—Royal Natural History, Vol. 3 (Warne).—Geschichte der Explosivstoffe. I. Geschichte der Sprengstoffchemie der Sprengtechnik und des Torpedowesens: S. J. von Romocki (Berlin, Oppenheim).—The Scientific Transactions of the Royal Dublin Society, Vol 5 (series 2): The Brain of the Microcephalic Idiot: Prof. D. J. Cunningham (Williams).—Royal University of Ireland. Examination Papers, 1894 (Dublin, Ponsonby).—A Manual for the Study of Insects: J. H. and A. B. Comstock (Ithaca, Comstock).—Sitzungsberichte der K. B. Gesellschaft der Wissenschaften, Mathematisch-Naturwissenschaftliche Classe 1894 (Prag).

Pamphlets.—Summary Report of the Geological Survey Department for the Year 1894 (Ottawa, Dawson).—Elasticity a Mode of Motion: R. Stevenson (San Francisco).—Kindergarten Mathematics (series A)—Algebra, Part 1: M. H. Senior (Oldham, Bardsley).—Petroleum, its Development and Uses: R. N. Boyd (Whittaker).—Notes on the Geology of the Island of Cuba: R. T. Hill (Cambridge, Mass.).—Jahresbericht der K. B. Gesellschaft der Wissenschaften, 1894 (Prag).

Serials.—Proceedings of the Physical Society of London, May (Taylor).—Bulletin of the American Mathematical Society, April (New York, Macmillan).—Strand Magazine, May (Newnes).—Picture Magazine, May (Newnes).—American Journal of Science, May (New Haven).—Gazzetta Chimica Italiana, 1895, Vol. 1, Fasc. 4 (Roma).—Engineering Magazine, May (Tucker).—Journal of the Chemical Society, May (Gurney).—Morphologisches Jahrbuch, 22 Band, 3 Heft (Leipzig, Engelmann).—Himmel und Erde, May (Berlin, Paetel).—Science Progress, May (Scientific Press, Ltd.).—Astrophysical Journal, May (Chicago).—Psychological Review, May (Macmillan).—The Flowering Plants and Ferns of New South Wales: J. H. Maiden, Part 1 (Sydney).—Bulletin du Comité Internationale Permanent pour l'Exécution Photógraphique de la Carte du Ciel, Tome ii. Troisième Fasc. (Paris, Gauthier-Villars).—Reports on the Victorian Coal-Fields: J. Stirling, No. 3 (Melbourne, Brain).

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